

Original Research Article

A study of effect of alcohol on liver function tests (LFT) in Garhwal hills, India

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ABSTRACT

Background: There has been frequent researches on liver pathologies and its variables in the world. There is no known research carried on liver in Garhwal region. Uttarakhand is one area where the hill people are more habitual of alcohol abuse and alcoholism is more endemic here. Primary objective was to correlate alcohol intake and its effect on liver function test. Secondary objectives were to screen the patients for abnormal LFTs and to observe and understand changes needed in lifestyle to reduce risk of developing liver disorders.

Methods: A cross sectional observational study was conducted on patients in a medical college in north India. The participants above the age of 10 years were included for the study.

Results: Out of all the 150 study participants screened, 120 (80%) were detected to have abnormal liver function tests (LFT) (65 females and 55 males). Maximum numbers of participants with abnormal LFT belong to age group of 21-30 yrs. More frequent and higher amount of alcohol consumption was found to adversely affect the liver physiology.

Conclusions: The most important risk factor for liver damage is frequent consumption of alcohol in excess of 4 pegs a day for males and 2 for females (One standard drink contains 10 grams of alcohol).

Keywords: Alcohol, Liver function test

INTRODUCTION

The liver is our body's most important organ after the heart.¹ Stress, poor diet, alcohol abuse and over-medication are common problems in our modern lifestyle. Alcohol use disorders affect millions of individuals worldwide. Liver is known as an organ that is primarily affected by alcohol. Alcoholic Liver disease is the cause of an increased morbidity and mortality and accounts for elevated social and economic costs.² Alcoholic liver disease (ALD) may take the form of acute involvement (alcoholic hepatitis) or chronic liver disease (steatosis, steatohepatitis, fibrosis and cirrhosis).³ There has been no known research on hepatic health of population of Garhwal region, India.

METHODS

A cross sectional observational study was conducted in the patients coming to the clinical biochemistry laboratory of tertiary care hospital. Sample Size-160 patients were selected and found to be eligible for the study, but 10 participants were not interested to be a part of the study and didn't give their consent. So, the study was completed on a sample size of 150 participants.

Study duration

Study was conducted for 6 months duration.

All the participants above the age of 10years coming to the clinical biochemistry laboratory were included in the study but those participants who were not willing and didn't give their consent were excluded. Informed consent was taken from every participant included in the study in the language understood by the participants. Contents of the consent were read out to the illiterate participants. Detailed history was taken and noted in a case study form which had questions on alcohol consumption of the participants in the form of questionnaire.⁴

Blood was collected under aseptic conditions in a sterile test tube for laboratory investigation as per standard prescribed norms. The blood was centrifuged, and serum was subjected to biochemical tests within 3hours of collection of the sample. Liver function tests done under the study constituted a group of seven tests used to evaluate the liver for injury, infection or inflammation. Tests performed were:

- Serum Bilirubin and fraction (total and direct),
- ALT (Alanine aminotransferase) or SGPT (Serum Glutamic-Pyruvic Transaminase),
- AST (Aspartate aminotransferase) or SGOT (Serum Glutamic Oxaloacetic Transaminase),
- ALP (Alkaline phosphatase),
- Total Serum Protein,
- Serum Albumin,
- GGT (Gamma glutamyl-transferase).

Instruments used in the study for analysis of biochemical parameters, fully automatic chemistry analyser eCOBAS 6000 c501, Germany was used.

All the case study forms were processed wherein the details like any abnormality in liver function test, dietary habits, frequency, type and amount of alcohol consumption, disease or drug intake affecting the liver were recorded. The collected data was tabulated and evaluated by various statistical tools like mean, median, mode, chi-square test with Yates correction, etc. to bring into account the statistical significance of the data.

RESULTS

Amongst the total 150 participants included in the study, 65 were males and 85 were females. The age of the

participants ranged from 17 to 78years. The mean age was 43.1years. The educational status of most of the participants was only up to primary classes.

Out of all the 150 study participants screened, 120 (80%) were detected to have abnormal liver function tests (LFT). Out of these, 65 (54%) were females and 55 (46%) were males. However, there was no significant difference between the prevalence of abnormal liver function tests amongst males and females [$\chi^2=1.061$, $p = 0.3031$]; Maximum numbers of participants with abnormal LFT belong to age group of 21-30yrs followed by the age group of 51-60yrs. More participants with normal LFT are seen in higher age group whereas there is no significant change of abnormal LFT with age (Figure 1).

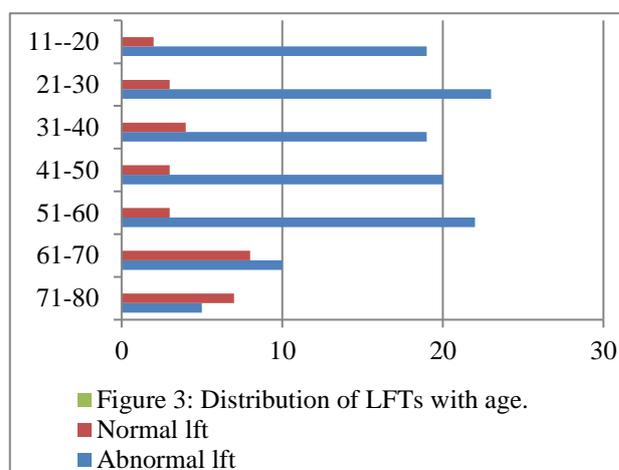


Figure 1: Distribution of liver function tests with age.

Out of the total 120 participants with abnormal LFT, 60 (50.0%) participants have abnormal total bilirubin ($2.92\pm 1.67\text{mg/dl}$), 85 (71.27%) have abnormal total protein ($5.35\pm 1.38\text{gm/dl}$), 100 (83.30%) have abnormal albumin level ($2.72\pm 0.67\text{gm/dl}$), 70 (58.30%) have abnormal ALT level ($43.63\pm 13.12\text{IU/dl}$), 65 (54.16%) have abnormal AST serum levels ($53.9\pm 19.94\text{IU/dl}$), 102 (67.48%) participants have abnormal alkaline phosphatase ($96.83\pm 14.84\text{IU/l}$) and 65 (54.17%) participants have abnormal GGT serum levels ($71.08\pm 24.47\text{IU/l}$) (Table 1).

Table 1: Showing number of patients with abnormal values of different parameters.

	Total bilirubin (>1.1 mg/dl)	Total protein (6.6-8.7 gm/dl)	Albumin (3.5-5.5 gm/dl)	SGOT (5-45 IU/l)	SGPT (5-40 IU/l)	ALP (male 38-94 IU/l female 28-78iu/l)	GGT (male 10-45iu/l female 5-32 IU/l)
No. of patients with normal values (%)	60 (50.0)	35 (28.73)	20 (16.7)	50 (41.7)	75 (45.84)	18 (32.52)	55 (45.83)
No. of patients with abnormal values (%)	60 (50.0)	85 (71.27)	100 (83.3)	70 (58.3)	65 (54.16)	102 (67.48)	65 (54.17)

65 (43.3%) participants were alcoholic, out of which 59 (39%) were males and only 6 (4%) were females (Figure 2). There was no significant relation between alcohol intake and abnormal liver function tests ($\chi^2=1.061$, $p=0.3031$).

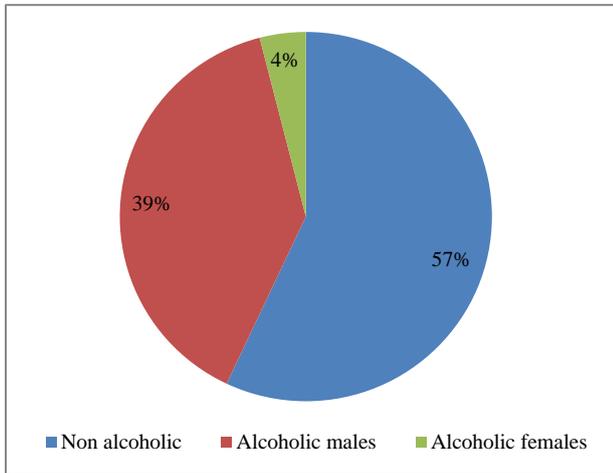


Figure 2: Showing relation of alcohol intake with sex.

But when alcohol intake was critically analysed considering the amount of alcohol consumed (four standard drinks i.e. 40 gm alcohol by weight per day for males and two standard drinks i.e. 20gms alcohol by weight per day for females) (Figure 3); it was found that there was a very significant relationship between increasing alcohol amount per day with abnormalities in LFT ($\chi^2=8.054$, $p=0.045$).⁵

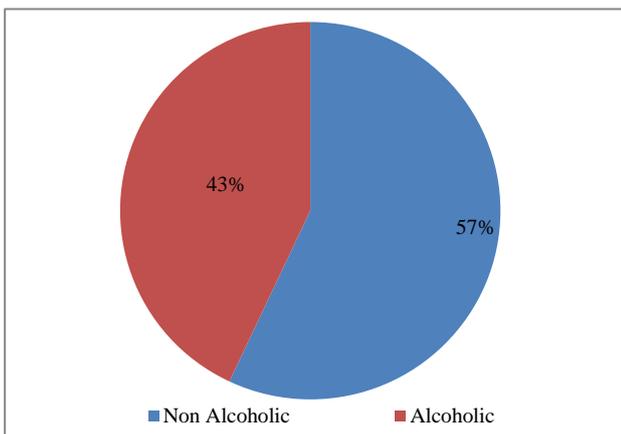


Figure 3: a) Distribution of alcohol consumption.

This is also clearly indicated in Figure 4 where we can see that more number of alcoholics with normal LFT is towards left side of graph i.e. consuming lesser amount of alcohol than those with abnormal LFT.

Out of 65 alcoholics, 20 males (30%) have AST/ALT ratio (de ritis ratio) greater than 2 which is highly

suggestive of alcoholic liver disease. When alcohol intake was analysed considering GGT as the variable, it was found that there was a very significant relationship between alcohol consumption and abnormalities in GGT ($\chi^2=15.64$, $p<0.0001$).

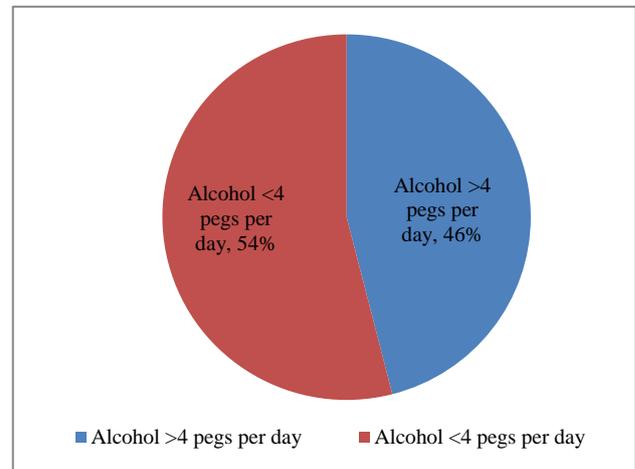


Figure 3: b) Distribution of alcohol consumption.

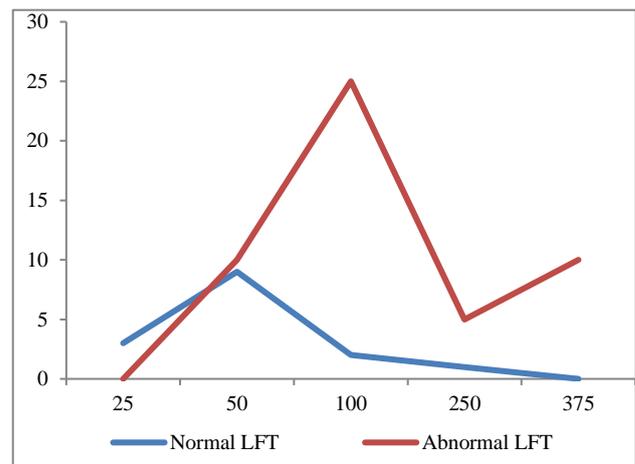


Figure 4: Line diagram showing relation of amount of alcohol to abnormal LFT (%).

DISCUSSION

Liver disease is an insidious process in which the clinical detection may occur weeks, months or many years after the onset of injury. Early clinical detection can be done only by abnormal laboratory tests. Liver is vulnerable to wide variety of metabolic, toxic, microbial and neoplastic insults of which metabolic and toxic insults were taken into consideration in this study because these are more commonly found in a given area.⁶ Alcohol, one of the important products of global addiction is a common substance of abuse in Garhwal region of India. This study was done to give more stress on hepatic health by preventing liver diseases so as to implement some basic health care needs to the society.

80% of all the participants of the present study were found to have abnormal liver function tests. More number of participants with abnormal LFT was found to belong to younger age group [(10-30yrs; 42 (92% of younger group)] as compared to the middle aged or elderly people [(above 30yrs) 75 (73.5% of the middle aged or elderly people)] because liver injury by toxic contents of diet including alcohol is more common in adolescent age group in this region. Alcohol abuse is very common among younger people living in rural and remote areas.

Alcohol is a prominent substance of abuse in remote areas of Garhwal region.⁷ The problem is not only with adults, but alcohol abuse starts in late teenage years. According to a new study, more and more adolescents are turning to liquor because it's cool, adult-like and trendy. Others drink out of curiosity or to cope with rough patches due to stresses, peer pressure or disturbed childhood.⁸

Critical analysis of the data was done taking frequency and amount into the consideration. It is known that after moderate alcohol consumption, most of the ingested alcohol is broken down by the alcohol dehydrogenase pathway (ADH). After chronic heavy alcohol consumption, the Microsomal Ethanol-Oxidizing System (MEOS) pathway of alcohol metabolism becomes more important leading to more oxidative stress. In the present study also, there is significant relation of amount and frequency of alcohol consumption to LFT.

There were 16 (10.66%) participants with alcohol consumption more than 100 ml a day and only one of them has normal LFT, all others have abnormal high levels of transaminases and phosphatases. Excess alcohol intake causes its toxic effects by production of excess NADH which leads to generation of fatty acids and reduce fat breakdown, thus accumulating more fat in liver. Acetaldehyde further causes deactivation of proteins; increased collagen production leading to fibrosis; inhibited DNA repair resulting in mutations and cell death.⁹

In the present study we have found a significant number of participants (30%) with AST/ALT ratio greater than 2 which suggest advanced alcoholic liver disease.¹⁰ A significant correlation in the level of serum GGT is observed in alcoholics when compared with the normal subjects and these results appear to depend on the dose and duration of the alcohol consumption.

CONCLUSION

The present study clearly establishes that alcohol has direct effect on the physiological functioning of the liver which is proved by alteration in liver function tests. It is also noted that the amount and duration of alcohol consumption is directly related to alcoholic liver diseases. Co-relation between previous episode of jaundice and abnormal liver function tests is also proved statistically in

the present study. It is also found that low socioeconomic status along with poor nutritional habits of the population of the study area has a link with altered liver function tests. Precisely saying, it is found that nutrition and alcohol have an effect on LFT and thus on the liver.

The study has found that liver function test is impaired in the following situations: Frequent consumption of alcohol in excess of 4 pegs a day for males and 2 for females (One standard drink contains 10grams of alcohol). More prospective studies (considering other dietary constituents and drugs generally abused apart from alcohol) are needed to determine all the risk factors for the development and progression of liver diseases to help identify patients at highest risk as no single test represents overall complexity of liver function.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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